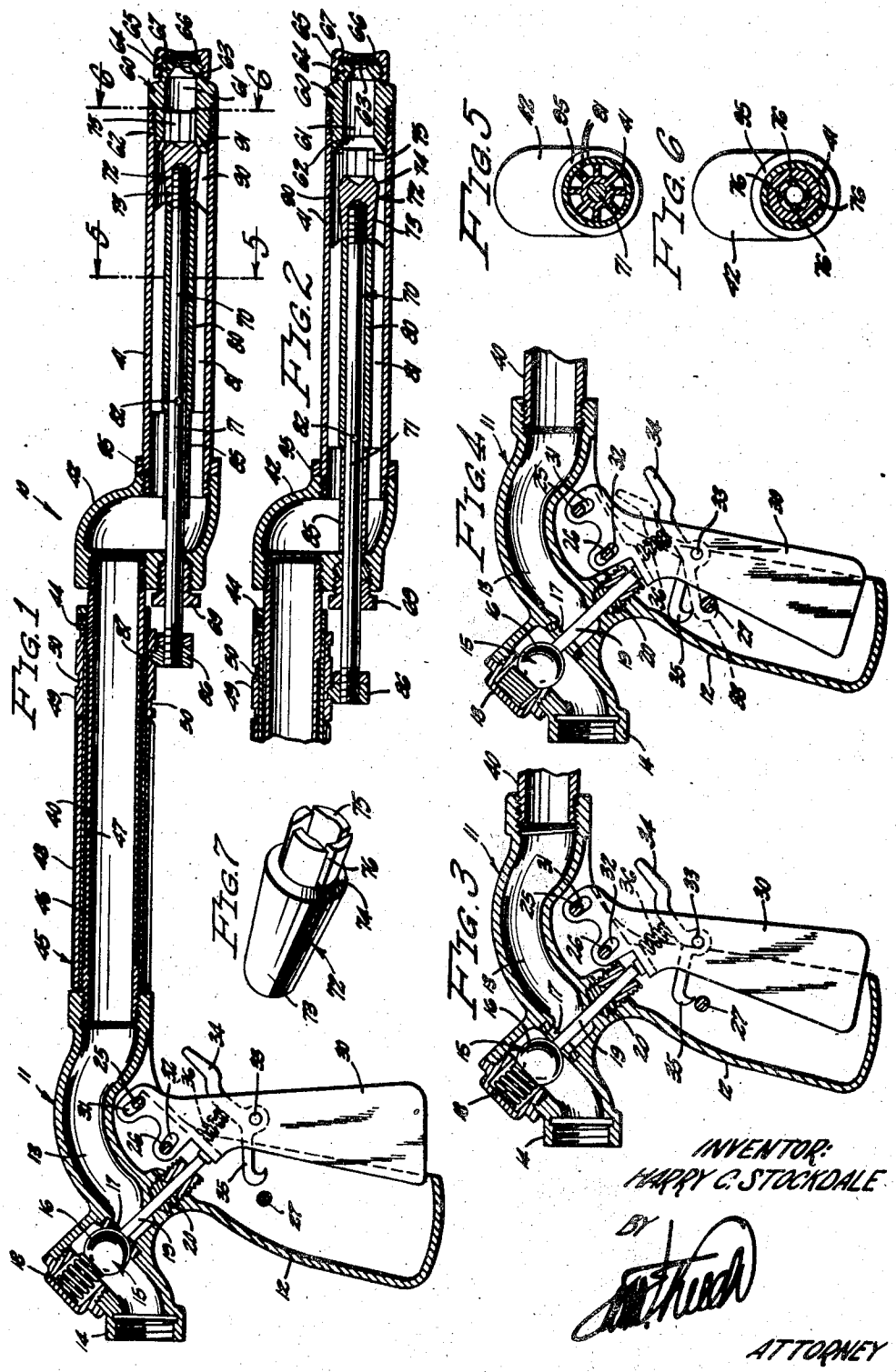
March 4, 1947. H. C. STOCKDALE 2,416,719

SPRAY GUN

Original Filed July 31, 1940



Patented Mar. 4, 1947

2,416,719

UNITED STATES PATENT OFFICE

2,416,719

SPRAY GUN

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Original application July 31, 1940, Serial No. 348,749. Divided and this application March 26, 1943, Serial No. 480,613

6 Claims. (Cl. 299—112)

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This invention relates to spray guns and particularly to spray guns operating under relatively high pressure.

It is an object of this invention to provide a novel and efficient spray gun, the operation of which is relatively easy and which embodies means for controlling the form of the spray produced thereby which can be manipulated without removing the hands from the gun.

Another object of the invention is the provision of a spray gun having a novel valve trigger which may be locked to relieve the operator from pressure thereof while the valve is open, but which may be released from locked condition by a slight pressure on the trigger.

This application is a division of my co-pending application for U. S. Letters Patent Serial No. 348,749, filed July 31, 1940, for a Spray gun, and which has matured into Patent Number 2,362,946, November 14, 1944.

The manner of accomplishing the aforesaid objects, as well as further objects and advantages, will be made manifest in the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view through a preferred embodiment of the spray gun of my invention, showing the trigger valve closed and the spray control in a fine spray position.

Fig. 2 is a fragmentary view corresponding to the right hand half of Fig. 1, but illustrating the spray control mechanism positioned so as to throw a solid pencil-like stream of liquid from said gun.

Fig. 3 is a view similar to Fig. 1 of the handle portion of said gun, illustrating the operation of the trigger mechanism to "crack" the valve open.

Fig. 4 is a view similar to Fig. 3 illustrating further opening of the trigger valve after this has been cracked, as shown in Fig. 3.

Fig. 5 is a cross-sectional view taken on the line 5—5 of Fig. 1 showing the liquid straightening spider provided in the invention.

Fig. 6 is a cross-sectional view taken on the line 6—6 of Fig. 1 and a front elevational view of the whirl member of said spray gun.

Fig. 7 is an enlarged perspective view of said whirl member.

Referring specifically to the drawings, the preferred embodiment 10 of the spray gun of this invention shown therein includes a butt member or base 11 having a pistol grip 12 to assist in supporting and controlling the gun. Formed in the butt member 11 is a liquid passage 13, there being a hose connection 14 at the outer end of this for

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connecting a hose to the gun. Also provided in the butt member 11 to control the passage 13 is a valve 15 including a valve ball 16 which is urged against a seat 17 by a pressure spring 18 and is adapted to be lifted from this seat by a valve stem 19 which enters the passage 13 through a packing gland 20.

The pistol grip 12 is hollow and has fulcrum pins 25 and 26, which are disposed varying distances from the stem 19, and a latch pin 27 on the opposite side of the stem therefrom. Mounted in the grip 12 is a trigger 30 having slots 31 and 32 which receive the pins 25 and 26 respectively as clearly shown in Figs. 1, 3 and 4.

Pivotally mounted by a pin 33 on the trigger 30 is a latch 34 having a hook 35 which is adapted to be hooked over the pin 27 when the trigger 30 is compressed so as to hold the valve 15 open. The position of the latch 34 when thus latching the trigger open is shown in broken lines in Fig. 4.

The latch 34 is urged into the position in which it is shown in full lines in Figs. 1, 3 and 4 by a coil spring 36. Thus, if the trigger 30 is compressed to open the valve 15 and while it is compressed the latch 34 is rocked into the broken line position 38 shown in Fig. 4 and the trigger released, the latch will hold the trigger in compressed position. In order to release the trigger 30 from the latch 34, it is now only necessary to press the trigger slightly, whereupon the spring 36 returns the latch to its full line position in the drawings so that when the hand is again relaxed from the trigger, the latter returns to its full line position shown in Fig. 1.

It is also to be noted that in operation the valve 15 by the trigger 30, the initial motion of the latter, which cracks the valve—that is, which first opens it against the pressure of liquid thereagainst—constitutes a rotation of the trigger 30 about the pin 26, thus giving a high degree of leverage to the trigger in cracking the valve. After the valve is cracked, however, not so much pressure is necessary to further open it, and in order to get a considerable movement during subsequent swinging of the trigger 30, the pin 25 provides a fulcrum for the trigger 30 as soon as the lost motion provided by the slot 31 is taken up. This situation is first reached when the trigger is positioned as shown in Fig. 3, after which further inward swinging of the trigger 30 gives a disproportionately large movement of the ball 16 of the valve 15 as shown in Fig. 4.

The spray gun 10 also includes a primary barrel 40 and a secondary barrel 41, adjacent ends of

which are connected in offset relation by an adapter 42. These barrels comprise cylindrical tubes which are relatively long when compared with the inside diameter thereof.

The primary barrel 40 is secured to the butt member 11 so as to communicate with the fluid passage 13. Adjustably fixed on the barrel 40 is a stop ring 44, there being a manual control sleeve 45 rotatably mounted on the barrel 40 between the ring 44 and the butt member 11. The sleeve 45 includes a cylindrical quill 46, the space inside which is partially relieved by a shallow recess 47 formed in the barrel 40. The quill 46 has a friction grip covering 48 which may be of corrugated rubber and a cylindrical cam 49 in which a cam groove 50 is formed.

The secondary barrel 41 has a nozzle member 60 screwed into its front end, this nozzle member being of relatively small cross-section, the portion thereof of largest diameter being flush with the outer surface of the barrel 41. The nozzle member 60 has a liquid whirling chamber 61 which is of smaller diameter than the interior of the barrel 41 and is connected with this barrel by a beveled fillet 62 provided on the inner end of the nozzle member 60. The chamber 61 has a tapered forward end which communicates with a narrow opening 63. The nozzle member 60 is formed with a nipple 64 which is threaded to receive a cap 65 which compresses a disc 66 and a packing washer 67 against the front end of the nozzle, the disc 66 having a central aperture of a size suitable for particular kinds of spraying operations for which it is desired to use the gun 10.

The adapter 42 is provided with an opening having a packing gland 69 which is concentric with the secondary barrel 41.

Longitudinally slidable in the secondary barrel 41 and self-guided by the interior surface of said barrel so as to be axially centered therein at all times under various operating conditions, is a liquid guiding and controlling device 70. This control device includes an assembly and operating shaft 71 which extends slidably through the gland 69 as shown in Figs. 1 and 2. The front end of this shaft is threaded into a liquid spreading and whirling head 72 having an expanding frusto-conical outer surface 73 and a counter-frusto-conical surface 74 at its front end, from which extends a tubular whirl sleeve 75. This sleeve has formed therein a series of slots 76, the latter lying in planes which are parallel with the axis of the barrel 41 and equi-distant from said axis so that said slots 76 have a spiral relation to the axis of the barrel.

It is to be noted that the sleeve 75 is of such a diameter as to slidably fit into the chamber 61 when the device 70 is slid in a rightward direction in the barrel 41. It is also to be noted that the frusto-conical surface 74 is disposed substantially parallel to the frusto-conical surface of the fillet 63 so that as the head 72 is moved to insert the sleeve 75 into the chamber 61 the annular passageway bounded by the frusto-conical surface 74 and the fillet 62 is uniform in thickness at various points therein.

The liquid guide and control device 70 includes a spider sleeve 80 having a series of guide fins 81 preferably formed integrally therewith and extending outwardly to slidably engage with the inner surface of the secondary barrel 41. The spider 80 is rigidly fixed upon the shaft 71 as by a pin 82. Snugly pressed over the shaft 71 is a stop sleeve 85 for limiting the rearward movement of the device 70.

Mounted on the rearwardly extending end of the shaft 71 is a cam follower nut 86 having a lug 87 which extends into the cam groove 50 of the cylindrical cam 49.

Operation

The gun 10 of this invention is adapted to be used for directing high pressure sprays with variable amounts of liquid and to deliver at option a rod-like stream of liquid. While applicable in many arts, this invention is particularly useful in the cleaning of automobiles.

Control of the amount of liquid contained in the spray or rod-like stream projected from the gun is accomplished by the size of orifice in the disc 66. Turning the flow on or off is effected by the trigger 30. Control of the spread of the spray or the selective formation of a rod-like stream of liquid is accomplished by rotation of the cylindrical control sleeve 45. This rotation operates through the cylindrical cam 49 to push and pull on the rod 71 and thus slide the entire liquid guiding and controlling device 70 axially in the secondary barrel 41.

As already pointed out, the fins 81 of the spider sleeve 80 of the device 70 bear against the inner surface of the barrel 41 and maintain this device during said sliding movement at all times axially aligned with said barrel. This, of course, also maintains the head 72 and sleeve 75 in true axial alignment with the nozzle member 60 and the whirling chamber 61 of the latter.

When the valve 16 is opened, by pressing on the trigger 30, the liquid rushes from the passage 13 through the barrel 40 and the adapter 42 into the barrel 41. In passing through the latter barrel, the liquid is guided by the guide fins 81 causing this liquid to travel in paths disposed just inside of the barrel 41 and parallel with the axis thereof. After traveling through the spaces between the fins 81, the liquid enters the annular space surrounding the head 72 where it passes through an increasingly restricted annular passageway 90, from which it flows as a tubular sheet of liquid into an annular space 91 which is disposed between the frusto-conical face 74 and the reverse frusto-conical face of the fillet 62.

If the space 91 is opened up by the extreme rearward positioning of the device 70 as shown in Fig. 2, the liquid passes directly through the space 91 and the nozzle chamber 61 and out through the central aperture in the nozzle disc 66 as a rod-like stream. The stream is thus formed with a high degree of efficiency, this being due to the axial direction imparted to the liquid as it travels between the guide fins 81 and the distention of these streams into a single tube-like sheet of liquid by the passage of these between the head 72 and the barrel 41. This tube-like stream of liquid is caused to converge when it strikes the fillet 62, and enters the chamber 61 with a minimum of friction and turbulence and thus produces a maximum of pressure and dynamic energy in the water occupying this chamber. This in turn produces a relatively high velocity in the rod-like stream of liquid expelled through the aperture in the disc 66.

In order to change this rod to a spray, the operator rotates the sleeve 45, thus propelling the guide and control device 70 axially forwardly in the barrel 41. Fig. 1 shows this operation carried to the point where a relatively fine spray will be emitted from the nozzle of the gun.

As the front end of the tubular whirl sleeve 75 enters the cylindrical nozzle chamber 61, the

liquid which theretofore has passed directly from the annular space 91 into the chamber 61, is now forced to flow through the tangential slots 76 into the interior of the sleeve 75 and thence into the chamber 61. As the liquid enters this chamber after passing through the slots 76, it is whirling rapidly about the axis of the nozzle 60 and forms itself into a whirling spray as it passes outwardly through the aperture in the disc 66.

It is to be noted that the slots 76 are formed in planes which are parallel with the axis of the liquid guiding and controlling device 70 and are spaced uniformly from this axis, these slots being substantially the full length of the sleeve 75 and being uniformly pitched relative to the axis of the head 72.

Attention is called to the fact that as the head 72 of the device 70 is moved toward the nozzle member 60, after the sleeve 75 has once entered the chamber 61, the effective area of the slots 76 is gradually decreased, yet at the same time the angle of the effective portions of these slots relative to the axis of the head 72 remains the same. Thus, although different quantities of liquid are admitted to the chamber 61 for the formation of the whirling spray by the gun 10, a relatively constant whirling tendency is imparted to this liquid as it enters this chamber, so that the spray formed by the gun 10, no matter what its intensity, is of substantially the same whirling character.

An outstanding advantage of the present invention resides in the ease with which it can be supported and the controls manipulated with the two hands of the operator without removing either of these hands from the gun. Whether the operator be right-handed or left-handed, he grasps the pistol grip 12 with one hand and, by clasping or partially relaxing the fingers of this hand, controls the valve 15 so as to open or shut this at will without taking this hand from the pistol grip. With the other hand the operator grasps the sleeve 45 which is connected to the axially shiftable control device 70 in the front or secondary gun barrel 41. By rotation of this sleeve the operator may control the character of the spray discharged from the nozzle of the gun without it being necessary for him to remove from this sleeve the hand with which it is gripped.

It is thus clear that the gun may be gripped tightly in both hands of the operator at all times while he is employing it for any purpose such as washing automobiles, and yet he is able at an instant's notice, to start or stop the flow of liquid through the gun or control the type of spray with which this liquid is discharged from the nozzle of the gun.

I claim:

1. In a spray gun, the combination of: a stationary barrel; a stationary nozzle on the end of said barrel; two grip means on said gun which are located conveniently with reference one to the other, so that the gun may be supported and manipulated in directing the spray therefrom on the objects being sprayed by gripping one of said grip means in the right hand and the other in the left hand; axially shiftable spray control means disposed within said barrel for modifying the character of spray issuing from said nozzle; means extending rearwardly from said spray control means and connecting the same with one of said grip means so that said control means may be actuated by the hand engaging said grip means without disturbing the normal engagement of said grip means and said hand in the manipulation of said gun; a valve for shutting off or starting a flow of liquid through said barrel; and means for operatively connecting said valve with the second of said grip means so that said flow of liquid may be started or shut off by the hand engaging said second grip means without disturbing the normal engagement of said hand with said second grip means in the support and manipulation of said gun.

2. In a spray gun, the combination of: a stationary barrel comprising two tubular barrel sections, offset from each other, and a fitting connecting adjacent ends of said sections; a stuffing box in said fitting disposed axially with respect to the forwardmost of said sections; a nozzle provided on the front end of said forward barrel section; an axially shiftable spray control device disposed within said forward barrel section; a rod connected to said control device and extending through said stuffing box; a sleeve rotatably mounted on the rearward of said barrel sections; means connecting said sleeve and said rod to effect axial movement of said rod in response to rotary movement of said sleeve; a pistol grip connected to the rear end of said rearward barrel section; a hose connection provided on the upper portion of said pistol grip, there being a passageway between said connection and said rearward barrel section; a valve controlling said passageway; and a trigger on said pistol grip adapted to be actuated by varying the pressure on said trigger of the fingers with which said pistol grip is gripped to open or close said valve.

3. In a spray gun the combination of: a stationary barrel comprising two tubular barrel sections, offset from each other, and a fitting connecting adjacent ends of said sections; a stuffing box in said fitting disposed axially with respect to the forwardmost of said sections; a nozzle provided on the front end of said barrel section; an axially shiftable spray control device disposed within said forward barrel section; a rod connected to said control device and extending through said stuffing box; a sleeve rotatively mounted on the rearward of said barrel sections; means connecting said sleeve and said rod to effect axial movement of said rod in response to rotary movement of said sleeve; a pistol grip connected to the rear end of said rearward barrel section; a hose connection on said gun, there being a passageway between said connection and said rearward barrel section; a valve controlling said passageway; and means on said pistol grip for operating said valve so that the flow of liquid through said passageway may be started or shut off by the hand grasping said pistol grip without disturbing the normal hold of said hand on said pistol grip in the support and manipulation of said gun.

4. In a spray gun, the combination of: a grip base; a pistol grip provided thereon; a shut-off valve provided on said base; a trigger for operating said valve by the fingers of one hand holding said pistol grip and without relaxing the hold of said hand on said pistol grip; a barrel fixed upon said base; a nozzle fixed upon the end of said barrel; a spray control rod disposed within said barrel; means on said rod and actuated by movement thereof to control the spray emitted from said nozzle; a stuffing box through which said rod extends rearwardly out of said barrel; a grip means provided on said barrel and adapted to be held by the other hand to assist in supporting said gun; and means connecting said grip means to the extending end of said rod to actuate

said spray control means by movement of said grip means by the hand holding the same and without relaxing the hold of said hand on said grip means.

5. In a spray gun, the combination of: a grip base; a pistol grip provided thereon; a shut-off valve provided on said base; a trigger for operating said valve by the fingers of one hand holding said pistol grip and without relaxing the hold of said hand on said pistol grip; a barrel fixed upon said base; a nozzle fixed upon the end of said barrel; means within said barrel for cooperating with said nozzle to control the spray emitted from said nozzle; a grip means provided on said barrel and adapted to be held by the other hand to assist in supporting said gun; a stuffing box connecting the space within said barrel to the exterior thereof; and means extending through said stuffing box and connecting said grip means to said spray control means to actuate the latter by movement of said grip means by the hand holding the same and without relaxing the hold of said hand on said grip means.

6. In a spray gun, the combination of: a grip base; a pistol grip provided thereon; a shut-off valve provided on said base; a trigger for operating said valve by the fingers of one hand holding said pistol grip and without relaxing the hold of said hand on said pistol grip; a barrel fixed upon said base; a nozzle fixed upon the end of said barrel; means within said barrel for cooperating with said nozzle to control the spray emitted from said nozzle; a stuffing box having an opening connecting the space within said barrel with the exterior thereof; and means provided on said barrel for assisting in the support of said gun and actuating said spray control means with the other hand which includes another grip adapted to be held in said hand and means extending through said opening in said stuffing box and connecting said grip to said spray control means whereby the latter may be actuated by movement of said grip by the hand holding the same and without relaxing the hold of said hand on said grip.

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